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NEW MANAGEMENT OF APPARENTLY UNCONTROLLABLE HEMORRHAGE FROM THE KIDNEY DURING NEPHROTOMY.

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Hemorrhage from the kidney when incised is a frequent occurrence and has often taxed the ingenuity of the operator to successfully control the bleeding organ.

The typical anatomical circulation of the kidney is sufficient in itself to suggest that an incision through its substance must result in an abundant outflow of blood.

For a better understanding of what is to follow it will not be out of place to review the blood supply of the kidney; this I find very clearly described in Vol. V of E. Von Bergmann's System of Surgery, and is as follows:

The chief vessel of the kidney, and the only one which enables it to perform its functions, is the renal artery. This vessel, whose diameter (6 cm.; 2.4 inches), is quite out of proportion to the size of the organ, springs at right angles from the abdominal aorta and usually divides into four branches before it enters the hilus of the kidney. Two of these branches enter the anterior portion of the organ, and two of them the posterior portion. This is the usual distribution. Jössel describes the renal artery as dividing into two anterior, one superior, and one posterior branch. One of the two anterior branches goes to the middle of the organ and the other to the lower portion. The upper branch is distributed to the upper end of the kidney. The posterior branch is distributed to the lower two-thirds of the posterior surface of the kidney. The arrangement of the arteries is frequently different from that described as normal.

Zondek examined fifteen kidneys, and found that nine of them were supplied by one renal artery, five by two, and one by three arteries. Instead of two anterior and two posterior branches, he sometimes found two anterior and only one posterior branch; or, an inferior branch of the lower pole, a middle branch for the middle part of the anterior surface, and an upper branch for the rest of the kidney.

These descriptions of the renal circulation make it obvious that the operator must be in all readiness to combat hemorrhage. The methods, thus far at our command, as suggested in all textbooks and by all writers on the subject, to meet extraordinary hemorrhages are:

1. To compress the renal vessels during the operation.

2. Dry gauze pressure on the bleeding surface.

3. Placing ligatures or stitches through the cortex of the kidney which encircles and closes the open vessels.

4. I will also add the almost boiling water application.

5. The cautery which would perhaps efficiently cause the vessels and capillaries of the kidney to recoil in cases of uncontrollable hemorrhage, would at the same time destroy the limited kidney substance, which an organ, that requires such treatment, has.

Here we have reached the limit of our resources, when precedent fails to guide and advise us; unless we are willing to sacrifice the kidney by performing,

6. Nephrectomy.

In those cases, however, where the radical nephrectomy would mean death to the patient owing to the absence or inactivity of the second kidney, the surgeon finds himself in a state of perplexity, where skill is thwarted by want of precedent.

Confronted with a case of that kind in which all known methods have failed, I have at the impulse of the emergency moment employed a new method, which will appear in the history of the case and the description of the operation.

After narrating my experience to several prominent surgeons, whose ability and knowledge I admire and respect; among others my distinguished chiefs Professors H. Beekman Delatour, John J. McGrath and Warren L. Duffield, also to Professors Paul M. Pilcher and John O. Polak; and when they informed me that they had never heard nor read of this method of treatment before, I felt justified in reading the report of the following case before the Brooklyn Surgical Society, and in publishing this article in one of the leading surgical journals of our country. The history of the patient is:

A. L., 52 years of age, married 26 years and the father of four children; Russian pedler by occupation, was referred to me by Dr. A. Glickstein with whom I had seen the patient in consultation one week before operation.

General appearance: A worn-out, thin looking man; sallow, anemic face. He had always been well with the exception of having had a discharge of pus from the urethra about fifteen years ago. Three years ago he commenced to feel pain in the right kidney region, which was occasionally so severe that he had to go to bed.

In the past six months he had lost considerable flesh and had grown much weaker. The present attack put him to bed about ten days before I was called to see him. Subjectively he complained of constant pain in the right kidney region. He urinated regularly and without pain.

On palpating the right lumbar region, opposite the last rib and two inches from the spine, there was an area tender on deep pressure.

On February 6, 1907, he entered St. Mark's Hospital, New York·City.

Urine Examination.—Specific gravity, 1,012; reaction, acid; color, pale, watery; transparency, slightly turbid; albumen, a trace (¼ g. in 1,000 cc.); sugar, none.

Microscopically.—Casts, none; blood, large numbers of red cells; pus, large number of leucocytes; epithelium, few squamous; crystals, none; amorphous deposits, granular.

Operation.—After due preparation of the patient with full aseptic precautions, I made the original lumbar incision of Simon for exploratory purposes or simple nephrectomy, beginning below the eleventh rib and extending it downward 10 cm. along the anterior border of the sacro lumbalis muscle, of the right side. This incision I subsequently enlarged. I divided the skin, subcutaneous fat, superficial fascia and the latissimus dorsi muscle, and reached the firm fascial sheath of the sacro lumbalis muscle which I divided, and laid bare the rounded border of the muscle. I then divided the post fascia of the muscle and ligated the twelfth intercostal and first lumbar arteries, which led me down to the quadratus lumbar muscle. This muscle I divided longitudinally, and reached the fatty capsule of the kidney and divided the same. It was very much thickened and closely adherent to the kidney. The separation of the kidney from its surrounding parts was very difficult on account of numerous adhesions which had formed. Several fibrous bands were present which held the kidney fixed in its position. These I ligated and divided. I then succeeded, with great difficulty, in bringing down an abnormal sized kidney, and delivered it through the incision.

The organ was about thrice the normal size, lobulated, capsule adherent, with several bands constricting the kidney substance.

After using the exploratory needles at several points. I incised the kidney through the parenchyma at its convex border, and opened the pelvis.

At the lower pole a cavity containing about ℥i of pus was evacuated. The pus cavity did not communicate with the pelvis of the kidney. There were no stones. From the incised surface, an enormous quantity of blood poured out, which was uncontrollable by the application of every known method except nephrectomy.

The renal vessels were held open by adhesions formed between the kidney substance and the vessel walls. The kidney substance was friable, so that on passing a ligature through it and around the vessels there only resulted a cutting through of its tissues.

The applications of boiling water by means of a gauze pad were ineffective. Dry gauze compression was useless. There was only one known available procedure at this emergency moment and that was to remove the kidney. The enormous size of this important organ suggested to me that it was in a state of compensating hypertrophy and that the other kidney was either inactive or entirely absent.

Not having made a cystopic examination before the operation, it was too late, at this stage, to serve as an aid for determining the existence of the second kidney. To remove the kidney, then, according to my supposition, was to kill the patient. I then resorted to a method of controlling the hemorrhage which I had never read nor heard of before.

I packed the interior of the kidney with plain gauze, but in noticing that it rapidly became saturated with blood, I closed the two halves of the kidney upon it, and surrounded the entire kidney with several strips of plain gauze. The strips of gauze on the external surface of the kidney were wound around sufficiently tight to insure the closing of the open vessels by the gauze within the cut surface of the kidney. The skin incision I covered on both sides with plain gauze, and also placed strips of gauze along both sides of the ureters for about three inches, to prevent adhesions from forming. The entire kidney I then covered with several pads of plain gauze and permitted it to remain outside of the body, resting upon the gauze covering of the skin incision. Several strips of z.o. adhesive plaster served to keep the dressing in position.

The day after operation, February 8, 1907: 8:00 A. M., temp. 99.8° Fahr., pulse 104, resp. 24; 8:00 P. M., temp. 100° Fahr., pulse 92, resp. 24. On February 9, 1907: 8:00 A. M., temp. 99.6° Fahr., pulse 86, resp. 24. This being forty-eight hours after operation, I proceeded under ether anesthesia to reduce the kidney to its normal position. The external dressings were saturated with urine, somewhat tinged with blood.

On removing the packing from the interior of the kidney, I was confronted with the same hemorrhage as on the day of the original operation, so that I quickly repacked the kidney and re-dressed it in the same manner as the first time, with plain gauze and adhesive straps, and allowed it to rest outside of the body. The evening temperature of that day was 100° Fahr.; pulse, 92; respiration, 24.

On February 10, 1907, the patient felt good, with a temperature of 99° Fahr.; pulse, 92; respiration, 24. I permitted him to be out of bed for several hours and to walk to the "fort of necessity" (lavatory) in the hall.

On February 11, 1907: 8:00 A. M., temp, 98.6° Fahr.; pulse, 80; resp., 20; 8:00 P. M., temp.. 98° Fahr.; pulse, 80; resp., 24. The patient felt good all day, and partook of fluid diet. Part of the day he walked or sat around his bed. When in bed he rested on one side or the other, or with face down.

On February 12, 1907, the morning temperature was 98° Fahr.; pulse, 84; respiration, 26. The patient felt very good. This being the fifth day after operation with the kidney outside of the body, I once more had him anesthetized, and on removing the gauze packing from the kidney, I found that the bleeding from the vessel had entirely stopped. I took out the gauze from the wound along the ureter and from both sides of the skin incision and reduced the kidney to its normal anatomical bed. I then packed strips of plain gauze in the kidney and dressed the wound as usual.

The evening temperature of that day was 99.4° Fahr.; pulse, 84; respiration, 28.

February 13, 1907: 8:00 A. M., temp., 98.4° Fahr.; pulse, 80, respiration, 22; 8:00 P. M., temp., 98.6° Fahr.; pulse, 84; respiration, 24. February 14 and 15, 1907: Temp., 98.6° Fahr.; pulse, 84; respiration, 24. The patient complained of no pain, sat in bed and a part of the time outside of his bed, took light food, and felt comfortable.

February 16, 1907: 8:00 A. M., temp, 100° Fahr.; pulse, 100; respiration, 22. February 17, 1907: 8:00 A. M., temp., 98° Fahr.; pulse, 88; respiration, 22: 4:00 P. M., temp., 100° Fahr.; pulse, 98; respiration, 22. February 18, 1907: 8:00 A. M., temp., 98° Fahr.; pulse, 90; respiration, 22; 4:00 P. M., temp., 98.6° Fahr.; pulse, 88; respiration, 24. The patient complained of general weakness all day and did not leave his bed. Stimulants consisting of strychnin, digitalis and whiskey, were administered.

February 19, 1907: At 8:00 A. M., temperature, 98.8° Fahr.; pulse, 112; respiration, 26. The patient looked very much exhausted all day and complained of extreme weakness. The evening temperature was 98.6 Fahr.; pulse, 108; respiration, 24. During the night he developed pulmonary edema and on February 20, 1907, with a temperature of 98° Fahr., pulse of 96, he died at 11:50 A. M.

Dr. Gans, of the House Staff, very kindly reopened the partly healed incision and took out the incised kidney, and then succeeded, through the same opening, in reaching and removing the left kidney which proved to be smaller than normal. The organ was studded with numerous small abscesses, about the size of a hazel nut, bulging out from the cortex all around the kidney. On cutting through this left kidney, the interior revealed a large abscess cavity, with creamy pus. There was no kidney substance except the cortex, which was about a quarter of an inch in thickness.

The evidence of the findings in and around the left kidney, was conclusive proof that it was not functionating and that the patient had no chance of recovery with or without operation. The limited kidney substance which he had in the kidney I operated upon was only enough for him to functionate with for thirteen days after the operation.

The patient passed from 25 to 35 ounces of urine daily per urethram in the first ten days after operation, in addition to the quantity of urine which passed through the dressings. In the last three days before his death the quantities of urine were 21, 12, and 8 ounces, respectively, when evidently the kidney had no more substance to functionate with.

The infection most likely began as a bacterial embolism in the renal parenchyma, forming multiple abscesses in the left kidney, some of which broke and filled the pelvis, producing pyelitis. This entirely destroyed the functional capacity of that kidney.

The destruction of the right kidney commenced in like manner with that of its fellow, and was about to discontinue its physiological action when I operated upon it.

This method of treatment can be used in cases in which the character of the hemorrhage from a kidney is such as to make operation imperative, and when nephrectomy will be followed by continued bleeding in spite of gauze packing and sutures.

It can also be employed in cases of crushed kidneys, the result of traumatism.

Conclusion.—In all cases, therefore, where we are dealing with a compensating kidney; or where there is only one kidney in existence; or where the functionating kidney substance is limited; or where; from want of conservatism a kidney is to be saved; or where the operator is not certain of the existence and functionating power of the other kidney and he is unable to control the hemorrhage by any known method; it will be to his advantagfe to employ my method of treatment before performing nephrectomy.